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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/722,700	11/25/2003	Loucas Tsakalakos	19647.1	9948

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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
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EXAMINER

STADLER, REBECCA M

ART UNIT PAPER NUMBER

1754

DATE MAILED: 12/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/722,700	Applicant(s) TSAKALAKOS ET AL.	
	Examiner Rebecca M. Stadler	Art Unit 1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 November 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-53 is/are pending in the application.
- 4a) Of the above claim(s) 1-29 and 53 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 30-52 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-29, drawn to a method, classified in class 423, subclass 440.
- II. Claims 30-52, drawn to a device, classified in class 313, subclass 309.
- III. Claim 53, drawn to a structure, classified in class 428, subclass 1+.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and III are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the nanonstructure can be made by arc discharge

Inventions I and II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case they are different inventions because the method will not make the product.

Inventions II and III are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, Invention III has separate utility such as for use as an abrasive. See MPEP § 806.05(d).

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different subject matter and classification, restriction for examination purposes as indicated is proper. There is a burden of search.

During a telephone conversation with Bryan Bockhop on December 5, 2005 a provisional election was made without traverse to prosecute the invention of Group II, claims 30-52. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-29 and 53 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 43 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 43 is in improper form for a Markush group.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 30, 31, 35, 38, 40, 42-48, and 50-51 are rejected under 35 U.S.C. 102(b) as being anticipated by Xu 5,973,444.

As to claims 30, 31, 38, and 40, Xu '444 discloses a field emission device comprising a substrate; a dielectric layer; a conductive layer (in the Xu reference, the conductive layer is called a patterned gate metal film); and carbon fiber emitters (nanorods) (see abstract and column 5, lines 24-30, see also figure 1 and column 14, lines 40-43). Xu '444 teaches a

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resistor layer (see column 6, lines 11-29). As to claim 44, see Figure 1. Further, Xu discloses a catalyst metal film on top of the substrate with carbon fiber emitters on the metal (see column 5, lines 29-30).

With regard to claims 35 and 48, the substrate of Xu can be an inorganic monocrystalline substance (see column 6, lines 33-35).

As to claim 42, Xu '444 discloses carbon fiber emitters having diameters of 20-100 nm (see column 19 lines 65-67).

As to claim 43, it is irrelevant where the carburized metal is from. No difference is seen between the carburized metal (referred to in Xu as carbon fiber emitters) of Xu '444 and the carburized metal of the claim. See column 9, lines 25-32.

As to claim 45, Xu '444 discloses a structure on top of the substrate, which can be a cone (see column 14, lines 22-32).

As to claim 46, Xu '444 teaches that the catalyst (the conductive layer) can be a transition metal, including molybdenum, platinum, palladium and niobium (see column 9, lines 26-39).

As to claim 47, Xu '444 discloses that the fiber emitter (nanorod) can be a carbide (see column 9, lines 25-32).

As to claims 50 and 51, Xu '444 discloses that the substrate can be a polycrystalline material or a glassy amorphous material (see column 6, lines 34-37)

Claim Rejections - 35 USC § 103

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu '444 in view of Kane 5,157,304.

The rejection of claim 30 above is incorporated herein.

Xu '444 does not disclose that its field emission device can be used in imaging systems. Kane '304 does teach that field emission devices can be used in imaging systems (see column 1, lines 12-24). It would have been obvious to one of ordinary skill at the time of this invention to use the field emission device in an imaging system as suggested by Kane '304.

Claims 30 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu '444 in view of Hunt 6,054,801.

The rejection of claim 30 above is incorporated herein.

Xu '444 does not disclose that its field emission device can be used in a lighting system. Hunt '801 does teach that field emission devices can be used in lighting systems (see column 1, lines 36-45). It would have been obvious to one of ordinary skill at the time of this invention to use the field emission device in a lighting system as suggested by Hunt '801.

Claims 30 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu '444 in view of Jin 6,465,132 and in further view of Takai 6,911,767.

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The rejection of claim 30 above is incorporated herein.

Xu '444 discloses that the fiber emitter (nanorod) can be a carbide (see column 9, lines 25-32). Xu does not disclose all of the limitations of the claim. However, Jin '132 does disclose that the nanowire of its invention can be a nitride (see abstract for the discussion regarding using the nanowires in a field emission device, see also column 10, lines 32-56, which discloses what materials can be used to make the nanowires). Takai '767 discloses using silicides in field emission devices (see column 12, lines 66-67). It would have been obvious to use any of these other materials for the nanorods in the present filed emission device because the references teach that the other materials are effective in field emitter devices.

Claims 30, 35, 36, 38-39, 44, and 48-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu '444.

The rejection of claims 30, 35, 38, 44 and 48 above are incorporated herein by reference.

As to claims 36, 39 and 49, it would have been obvious to one of ordinary skill in the art to select any of the monocrystalline substances for the substrate. Xu '444 teaches that any of the monocrystalline substances would work as the substrate (see column 6, lines 34-37).

Claims 30, 37, 44 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu '444 in view of Rowell 6,376,007.

The rejection of claims 30 and 44 is incorporated herein by reference.

Xu '444 does not disclose the material used for the dielectric layer. Rowell '007 discloses that its dielectric material can be silicon dioxide or silicon nitride. It would have been obvious to use silicon dioxide or silicon nitride as the dielectric layer in the Xu reference because Rowell '007 teaches that these materials are dielectric.

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Claims 38 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu '444 in view of Laude 6,586,093.

The rejection of claim 38 above is incorporated herein,

As to claim 41, Xu does not disclose the use of nanoribbons in a field emission device. However, Laude '093 discloses different nanostructures (including nanoribbons, see column 1, lines 7-11) that can be used in field emission devices (see column 4, lines 20-22).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rebecca M. Stadler whose telephone number is 571-272-5956.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stuart L. Hendrickson can be reached on 571-272-1351. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

rms



STUART L. HENDRICKSON
PRIMARY EXAMINER